Clay County School District 2015-2016
Biology Standard and Honors:

Notes for how to use this map

The curriculum map serves as a general pacing guide. The current textbook adoption has been aligned to the standards and is a valuable resource to support instruction. Each topic has the corresponding textbook section denoted. While the textbook provides support of the standard, note that instruction is based on standards, the textbook is a resource that supports the standard. Each standard is hyperlinked to the CPALMS.org website which provides additional resources. Nature of Science standards are to be taught throughout the course and are listed in the right hand column when they are covered in-depth. Learning objectives/targets are bulleted beneath each standard.

Classtime has been allotted for lab and inquiry within the classroom. This map suggests the The ADI (Argument Driven Inquiry) model. This model is highly recommended; however, your department may choose to use the lab days scheduled for ADI with a different format. The ADI labs suggested align to the content standards being taught. Each high school has been provided the ADI manual. Teachers have made suggestions based on their experience with the ADI model.

You may decide as a department/classroom to paces/organize concepts differently; however, adhering to the **quarter checkpoints** is **critical** to allow for ease of student transfers between classes/teachers/schools; especially as it concerns student placement (Honors/Standard) after the 1st quarter.

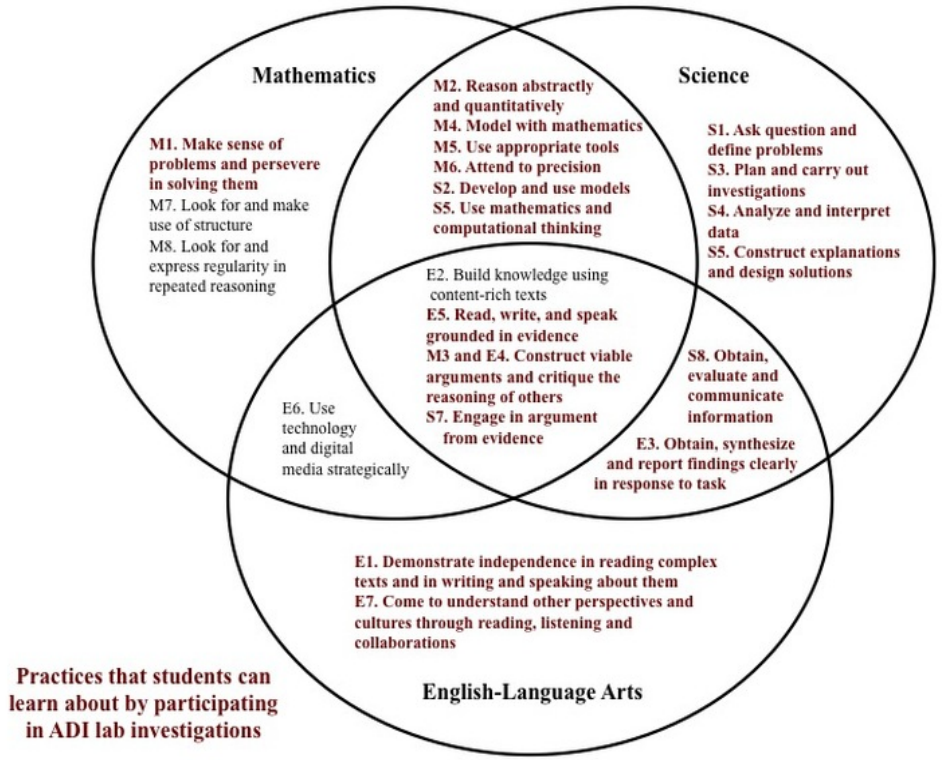
Flexible Days allow for assembly days, testing (FSA, EOC, AP) and Midterm and Final Exam Review.

Key:
Annually assessed EOC benchmarks: bold
Supporting benchmarks: plain text
- ● Learning Targets
- ❖ Content Limits
- ★ Vocabulary
- ❑ Quarterly Checkpoints

Instructional Practices to be integrated throughout the year as applicable

Science and Engineering Practices (NRC *Framework for K-12 Science Education)*	**Integrate Standards for Mathematical Practice (MP) as applicable. (K12)**	**Strategies for teaching from a range of complex text**	**English Language Development ELD Standards Special Notes Section:**
• Asking questions (for science) and defining problems (for engineering). • Developing and using models. • Planning and carrying out investigations. • Analyzing and interpreting data. • Using mathematics, information and computer technology, and computational thinking. • Constructing explanations (for science) and designing solutions (for engineering). • Engaging in argument from evidence. • Obtaining, evaluating, and communicating information.	• MAFS.K12.MP.1.1 Make sense of problems and persevere in solving them. • MAFS.K12.MP.2.1 Reason abstractly and quantitatively. • MAFS.K12.MP.3.1 Construct viable arguments and critique the reasoning of others. • MAFS.K12.MP.4.1 Model with mathematics. • MAFS.K12.MP.5.1 Use appropriate tools strategically. • MAFS.K12.MP.6.1 Attend to precision. • MAFS.K12.MP.7.1 Look for and make use of structure. • MAFS.K12.MP.8.1 Look for and express regularity in repeated reasoning.	1. Ensuring wide reading from complex text that varies in length. 2. Making close reading and rereading of texts central to lessons. 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence. 4. Emphasizing students supporting answers based upon evidence from the text. 5. Providing extensive research and writing opportunities (claims and evidence).	Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. … **2015 & Beyond NEW Standards** **ELD.K12.ELL.1.1: English language learners communicate for social and instructional purposes within the school setting.** **ELD.K12.ELL.XX.1: English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.**

Argument Driven Inquiries recommended as a part of every unit

Notes	Nature of Science Standard
Argument-Driven Inquiry is an innovative approach to laboratory instruction that is based on current research about how people learn science and current recommendations for making lab activities more meaningful for students. *Argument Driven Inquiry gives students an opportunity to learn how to participate in the practices of science and use the core ideas and crosscutting concepts of science to make sense of natural phenomena. This instructional approach also gives students an opportunity to learn how to read, write, and speak in the context of science.* - www.ArgumentDrivenInquiry.com **ADI's Come from** Argument-Driven Inquiry in Biology, by Sampson V. Through NSTApress **PACING : 3 Days** ● **Argument Driven Inquiry(ADI)**: Have been put at the end of each unit with 3 days for pacing, but may be completed as the classroom/department sees appropriate ● Pacing is based on **Option D** (page 504) layout that implements ADI in 3 days of class (there are 5 day options).  	SC.912.N.1.1: Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: 1. Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). 2. Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). 3. Examine books and other sources of information to see what is already known, 4. Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). 5. Plan investigations, (Design and evaluate a scientific investigation). 6. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). 7. Pose answers, explanations, or descriptions of events, 8. Generate explanations that explicate or describe natural phenomena (inferences), 9. Use appropriate evidence and reasoning to justify these explanations to others, 10. Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others. SC.912.N.4.1: Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making. SC.912.N.4.2: Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.

1st Semester (82 days)

Curriculum Map Overview

Unit #1:

Introduction and Nature of Science (2 weeks) (ch1)

- Welcome to class and Lab safety (school specific)
- Welcome to Biology (ch1)

Chemistry of Life and Cells (3 weeks)

- Chemistry of LIfe (ch 2)
- Cells (ch7)
- ❑ **1st Quarter Checkpoint (1,7)**

Unit #2:

Cellular Processes (8-9)

Molecular Genetics (12-13)

Cellular Division (10, 11.4)

- ❑ **2nd Quarter Checkpoint (8-10, 12-13)**

You may decide as a dept/classroom to paces/organize concepts differently; however, adhering to the **quarter checkpoints** is **critical** to allow for ease of student transfers between classes/teachers/schools; especially as it concerns leveling students from Honors to Standard after the 1st quarter.

Flexible Days allow for extra time on a topic, midterm/final exams review, assembly days, testing (FSA, EOC, AP), covering literacy/language standards, extra ADI days, etc.

On Going

1: Measurement
- SI Units
- Density
- Conversions

2: Scientific Method
- Identifying Variables
- Develop Experiments
- Gathering Data
- Analyzing Results
- Communicate Conclusions
- Publish Results

3: Using Models and Graphs
- Understanding models
- Changing Models
- Making Graphs
- Interpreting Graphs

4: Theory Vs Law Vs Hypothesis

5. Personal Health Choices

*these topics should be addressed continuously, and/or whenever the content allows for them

SAMPLE 1st Quarter. Sample is only to show how pacing might work it is not a day-to-day guide

Week	Monday	Tuesday	Wednesday	Thursday	Friday
1: 8/17-8/21	Intro.	Intro.	Intro.	Intro.	Intro.
2: 8/24-8/28	Ch1 Sci of Bio	Ch1 Sci of Bio	Ch1 Sci of Bio	Ch1 Sci of Bio	Ch1 Sci of Bio
3: 8/31-9/5	Flexible	Ch1 Sci of Bio	Ch1 Sci of Bio	Ch1 Sci of Bio	Ch1 Sci of Bio
4: 9/7-9/12		Ch 2 Chem of Life	Ch 2 Chem of Life	Ch 2 Chem of Life	Ch 2Chem of Life
5: 9/14-9/19	Flexible	Ch 2 Chem of Life	Ch 2 Chem of Life	Ch 2 Chem of Life	Ch 2 Chem of Life
6: 9/21-9/26	Flexible	Ch 7 Cells	Ch 7 Cells	Ch 7 Cells	Ch 7 Cells
7: 9/28-10/2	Flexible	Ch 7 Cells	Ch 7 Cells	Ch 7 Cells	Ch 7 Cells
8: 10/5-10/9	Flexible	ADI	ADI	ADI	Flexible

SAMPLE 2nd Quarter

9: 10/12-10/16	**Teacher Planning**	Ch 8 Photosynthesis	Ch 8 Photosynthesis	Ch 8 Photosynthesis	Ch 8 Photosynthesis
10: 10/19-10/23	Flexible	Ch 9 Cellular Respiration	Ch 9 Cellular Respiration	Ch 9 Cellular Respiration	Ch 9 Cellular Respiration
11: 10/27-10/30	Flexible	ADI	ADI	ADI	ADI
12: 11/2-11/6	Flexible	Ch 12 DNA	Ch 12 DNA	Ch 12 DNA	Ch 12 DNA
13: 11/9-11/13	Flexible	Ch 13 RNA & Protein Synthesis		Ch 13 RNA & Protein Synthesis	Ch 13 RNA & Protein Synthesis
14: 11/16-11/20	Flexible	Ch 13 RNA & Protein Synthesis	Ch 10 Cell Growth & Division	Ch 10 Cell Growth & Division	Ch 10 Cell Growth & Division

		11/23-11/27					
		15:11/30-12/4	Flexible	Ch 10 Cell Growth & Div	Ch 11.4 Meiosis	Ch 11.4 Meiosis	Ch 11.4 Meiosis
		16: 12/7-12/11	Flexible	ADI	ADI	ADI	Flexible
		17: 12/14-12/18	Flexible	Flexible	***½ Day***	***½ Day***	***½ Day***
		12/21-1/1	**Christmas/New Year's Break**				

1st Semester (82 days)

Introduction

Complete 1st week/ before end of 1st quarter/before 1st Lab activity

Days	Topics	Biology Standards	Nature of Science Standards
1-3	Welcome to class		
2-3	Welcome To Biology Science		SC.912.N.3.3: Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.
1-3	Lab Safety		

Unit #1 (1st 9 weeks)

Time	Topics	Biology Standards	On-Going/Nature of Science/Content Limits
	Nature of Science: 1.2 -Peer Review 1.2 -Theory and Law 1.2 -Ethics -Morality -Bias 1.2 -Metric System (SI) 1.3 -Characteristics of Life Vocabulary		**SC.912.N.1.1: Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following:** **1. Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts).** **2. Conduct systematic observations, (Write**

	★ independent variable ★ dependent variable ★ observation ★ hypothesis ★ theory ★ law ★ inference ★ data ★ peer review		**procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines).** **3. Examine books and other sources of information to see what is already known,** **4. Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models).** **5. Plan investigations, (Design and evaluate a scientific investigation).** 6. **Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage).** **7. Pose answers, explanations,**

			or descriptions of events, **8. Generate explanations that explicate or describe natural phenomena (inferences),** **9. Use appropriate evidence and reasoning to justify these explanations to others,** **10. Communicate results of scientific investigations, and** **11. Evaluate the merits of the explanations produced by others.** SC.912.N.1.4: Identify sources of information and assess their reliability according to the strict standards of scientific investigation. SC.912.N.1.6: Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied. SC.912.N.2.1: Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science). SC.912.N.2.2: Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion. *SC.912.N.2.4: Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.* SC.912.N.3.1: Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a

			substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer. SC.912.N.3.4: Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.
	Chemistry of Life: 2.1- Nature of Matter ***Honors Only* ★ chemical bond ★ covalent bond ★ ionic bond ★ molecule 2.2 -Properties of Water ★ polar bonds ★ hydrogen bonds ★ cohesion ★ adhesion ★ solvent ★ specific heat ★ thermal capacity 2.3 -Carbon Compounds ★ carbohydrate ★ lipid ★ enzyme ★ nucleic acid ★ protein ★ pH ★ monosaccharide ★ disaccharide ★ polysaccharides	*SC.912.P.8.7:* ***Interpret*** *formula representations of molecules and compounds in terms of composition and structure.* *****Honors Only*** ● *Write chemical formulas for* ○ *simple covalent compounds (CO_2 , CH_4)* ○ *ionic compounds ($Na^+ + Cl^- = NaCl$)* ○ *molecular compounds (O_2 , H_2O)* ○ *Predict the formulas of ionic compounds based on the number of valence electrons and the charges on the ions.* **SC.912.L.18.12: Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent. (EOC)** ● **explain** why the special properties of water make it essential for life, including: o polarity, hydrogen bonding, cohesive and adhesive behavior, ability to moderate temperature, universal solvent behavior, and expansion upon freezing **SC.912.L.18.1: Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules. (EOC)** ● **describe** basic molecular structures and primary functions of the four major categories of biological macromolecules, including: o carbohydrates, lipids, proteins, and nucleic acids *SC.912.L.18.2:* ***Describe*** *the important structural characteristics of monosaccharides, disaccharides, and polysaccharides and explain the functions of carbohydrates in living things.* *****Honors Only***	**Content Limits :** ❖ Items referring to the properties of water are limited to hydrogen bonding, polarity, cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent. ❖ Items may address adhesion but will not assess adhesion. **Content Limits :** ❖ Items will not refer to intermolecular forces found in the four types of macromolecules. ❖ Items will not assess hydrolysis and dehydration synthesis. ❖ Items referring to the role of enzymes as catalysts will use a biological context and not require knowledge of specific enzymes. ❖ Items referring to the factors that affect enzyme activity are limited to concentration, pH, and

	★ fatty acids ★ triglycerides ★ phospholipids ★ steroids 2.4 -Enzymes- impact on reactions ★ substrate ★ amino acids	• ***Describe*** *the important structural characteristics of monosaccharide's, disaccharides, and polysaccharides and explain the functions of carbohydrates in living things.* SC.912.L.18.3: ***Describe*** *the structures of fatty acids, triglycerides, phospholipids, and steroids.* ***Explain*** *the functions of lipids in living organisms.* ***Identify*** *some reactions that fatty acids undergo.* ***Relate*** *the structure and function of cell membranes.* *****Honors Only*** • ***Describe*** *the structures of fatty acids, triglycerides, phospholipids, and steroids.* SC.912.L.18.4: ***Describe*** *the structures of proteins and amino acids.* ***Explain*** *the functions of proteins in living organisms.* ***Identify*** *some reactions that amino acids undergo.* ***Relate*** *the structure and function of enzymes.* *****Honors Only*** • ***Explain*** *the function of lipids in living organisms.* ***Identify*** *some reactions that fatty acids undergo.* ***Relate*** *the structure and function of cells membrane.* SC.912.L.18.11: **Explain** the role of enzymes as catalysts that lower the activation energy of biochemical reactions. **Identify** factors, such as pH and temperature, and their effect on enzyme activity. • **predict** the effect pH, temperature, and substrate concentration have on enzyme activity • **explain** how an enzyme increases the rate of a biochemical reaction o enzymes decrease the activation energy of reactions by acting as a catalyst which is not consumed during the course of the reaction • **analyze** graphs from an experiment to draw conclusions on activation energy	temperature. ❖ Items will not require specific knowledge of how an enzyme reacts at a certain pH or temperature. Items will not assess the enzyme-substrate complex.
	Cells: 7.1 -Major scientists -Cell Theory -Microscope -Prokaryote/Eukaryote ★ magnification ★ resolution	**SC.912.L.14.1: Describe the scientific theory of cells (cell theory) and relate the history of its discovery to the process of science. (EOC)** • **describe** current the cell theory as: o all cells come from pre -existing cells o all living organisms are composed of one or more cells o cells are the basic unit of structure, function, and organization of all living organisms SC.912.L.14.4: **Compare and contrast** structure and function of various types of microscopes. • **differentiate** the function of various types of microscopes, including: o compound o scanning electron o transmission electron	**Content Limits :** ❖ Items may assess how contributions of scientists such as Van Leeuwenhoek, Hooke, Schwann, Schleiden, and/or Virchow aided in the development of the cell theory but will not assess what each scientist contributed. ❖ Items assessing a scientific claim, the development of a theory, or the differences between theories and laws are limited to the cell theory.

	★ (see content limits for vocabulary) 7.2 -Structure/Function of Organelles ★ passive transport ★ active transport ★ hypotonic ★ hypertonic ★ isotonic ★ facilitated diffusion ★ osmosis ★ endocytosis ★ exocytosis ★ endosymbiosis	SC.912.L.14.3: **Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells.** **(EOC)** ● **differentiate** the general structures and their function found within a cell ● **differentiate** the general structures of plant and animal cells, for example: o plant cells have central vacuoles, chloroplasts, and cell wall o animal cells have lysosomes ● **explain** how the structure of an organelle is directly related to its function in the cell, for example: o folding of the endoplasmic reticulum increases available surface area for protein o total available energy within a cell is dependent upon the number of packaging and transport mitochondria present, i.e. muscle cells have many mitochondria SC.912.L.14.2: **Relate** structure to function for the components of plant and animal cells. **Explain** the role of cell membranes as a highly selective barrier (passive and active transport). ● **explain** how both passive and active transport move materials across the cell membrane ● **predict** the impact to a plant or animal cell if placed in various types of solutions: o hypotonic o hypertonic o isotonic ● **explain** why cells are limited in size in terms of nutrient and waste transport create a model to simulate how a cell membrane works SC.912.L.14.5: ***Explain*** *the evidence supporting the scientific theory of the origin of eukaryotic cells (endosymbiosis)* ***Honors Only*** ● ***Explain*** *the evidence supporting the scientific theory of the origin of eukaryotic cells (endosymbiosis)*	**Content Limits :** ❖ Items will not address protists or fungi or assess cellular structures unique to protists or fungi. ❖ Items referring to prokaryotic structures are limited to the cell wall, cell membrane (plasma membrane), cytoplasm, plasmid, ribosomes, and flagella. ❖ Items referring to eukaryotic structures are limited to the cell wall, cell membrane (plasma membrane), cytoplasm, nucleus, nuclear envelope, nucleolus, chromatin, ribosomes, endoplasmic reticulum, microtubules, microfilaments, vacuoles, mitochondria, Golgi apparatus, chloroplasts, lysosomes, cilia, and flagella. ❖ Items referring to the role of the cell membrane may address hypotonic, hypertonic, and/or isotonic solutions; however, the assessment should be on processes and not terminology.
3	ADI	**Introduction** Lab 1- Osmosis and Diffusion **Application** Lab 2-Cell Structure	

1ST QUARTER CHECKPOINT

Unit #2 (2nd 9 weeks)

Days	Topics	Biology Standards	On-Going/Nature of Science/Content Limits

	Photosynthesis: 8.1 -Structure and function of ATP -ATP's role of energy for cell -Heterotroph and autotrophs ★ aerobic cellular respiration ★ anaerobic cellular respiration ★ photosynthesis ★ ATP ★ glycolysis ★ krebs cycle ★ electron transport chain ★ Potential energy ★ energy transformation ★ chemical energy 8.2 -Photosynthetic equation (reactants & products) -Overall photosynthetic process ★ reactant ★ product ★ light dependent reactions ★ light independent reactions (calvin cycle) ★ light	**SC.912.L.18.9: Explain the interrelated nature of photosynthesis and cellular respiration. (EOC)** ● **describe** the products and reactants of cellular respiration as the reactants and products of photosynthesis, for example: o carbon dioxide created in cellular respiration is used in photosynthesis o oxygen created through photosynthesis is used in cellular respiration SC.912.L.18.10: **Connect** the role of adenosine triphosphate (ATP) to energy transfers within a cell. *SC.912.P.10.1: **Differentiate** among the various forms of energy and recognize that they can be transformed from one form to others. ****Honors Only*** ● ***Differentiate** between kinetic and potential energy.* ● ***Recognize** that energy cannot be created or destroyed, only transformed.* ● ***Identify** examples of transformation of energy* ○ *Heat to light in incandescent electric light bulbs* ○ *Light to heat in laser drills* ○ *Electrical to sound in radios* ○ *Sound to electrical in microphones* ○ *Electrical to chemical in battery rechargers* ○ *Chemical to electrical in dry cells* ○ *Mechanical to electrical in generators [power plants]* ○ *Nuclear to heat in nuclear reactors* ○ *Gravitational potential energy of a falling object is converted to kinetic energy then to heat and sound energy when the object hits the ground.* SC.912.L.18.7: **Identify** the reactants, products, and basic functions of photosynthesis.	**Content Limits :** ❖ Items will not require the memorization of the stages, specific events, or intermediate molecules produced during these processes. ❖ Items will not require the balancing of equations. ❖ Items will not assess plant structures.

	Cellular Respiration: 9.1 - Reactants & products -Compare and contrast aerobic vs anaerobic -Compare and contrast photosynthesis and cellular respiration 9.3 -Fermentation: Lactic Acid vs Alcoholic (reactants & products) ★ pyruvate ★ lactic acid ★ ethanol ★ nad+ ★ fermentation	SC.912.L.18.8: **Identify** the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.	
	DNA: 12.2 -DNA structure and components -Introduce role of DNA 12.3 -Process of DNA replication ★ DNA replication ★ nucleotide ★ nitrogen base ★ phosphate ★ deoxyribose ★ guanine ★ cytosine ★ thymine ★ adenine **RNA & Protein Synthesis:** 13.1 -Role of RNA & Process of transcription ★ transcription ★ translation ★ mRNA ★ tRNA ★ ribosome ★ codon ★ start codon	**SC.912.L.16.3: Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic information. (EOC)** • **describe** the basic process of DNA replication • **explain** why DNA replication has a role in the transmission and conservation of the genetic material • **demonstrate** the process of DNA replication given a DNA strand SC.912.L.16.5: **Explain** the basic processes of transcription and translation, and how they result in the expression of genes. • **describe** the basic processes of protein synthesis: transcription and translation • **explain** how transcription and translation result in the expression of genes • **demonstrates** transcription given a DNA template • **demonstrates** translation given an mRNA message segment and a codon table	**Content Limits :** ❖ Items requiring the analysis of base pairs for gene mutations are limited to changes in a single gene. ❖ Items may refer to but will not assess the cell cycle, mitosis, and/or meiosis. ❖ Items will not require memorization of specific conditions resulting from chromosomal mutations. ❖ Items may refer to the process of meiosis in the context of mutations but will not assess meiosis in isolation. ❖ Items addressing transcription or translation will not require specific knowledge of initiation, elongation, or termination.

	★ stop codon ★ gene expression ★ genetic code ★ universal genetic code 13.2 -Genetic code -Process of translation -Molecular basis of heredity (gene expression) 13.3 -Mutations (compare and contrast gene and chromosomal types) ★ mutation ★ substitution ★ insertion ★ deletion	SC.912.L.16.9: **Explain** how and why the genetic code is universal and is common to almost all organisms. ● **explain** why the genetic code is universal ● **explain** why there are similarities in the genetic code of different organism most organisms share a common ancestry and the process of inheritance carries traits from generation to generation SC.912.L.16.4: **Explain** how mutations in the DNA sequence may or may not result in phenotypic change. **Explain** how mutations in gametes may result in phenotypic changes in offspring. ● **analyze** the causes of gene and chromosomal mutations to predict the possible effects in a DNA sequence ● **explain** how mutations in a DNA sequence may or may not result in a phenotypic change ● **explain** how mutations in gametes may result in phenotypic changes in offspring	
	Cell Growth & Division: 10.1 -Cell division -Compare and contrast asexual and sexual reproduction ★ mitosis ★ sexual reproduction ★ asexual reproduction ★ metaphase plate ★ cell plate ★ centrioles ★ genetic variation ★ spindle ★ sister chromatids ★ homologous chromosomes ★ centromere	**SC.912.L.16.17: Compare and contrast mitosis and meiosis and relate to the processes of sexual and asexual reproduction and their consequences for genetic variation. (EOC)** ● **differentiate** the processes of mitosis and meiosis ● **model or diagram** the process of mitosis and meiosis ● **explain** how sexual and asexual reproduction may contribute or limit genetic variation SC.912.L.16.14: **Describe** the cell cycle, including the process of mitosis. **Explain** the role of mitosis in the formation of new cells and its importance in maintaining chromosome number during asexual reproduction. ● **describe** the specific events that occur in each of the stages of the cell cycle (which include the phases of mitosis:) ○ interphase (Gap 1, Synthesis, Gap 2) ○ prophase ○ metaphase ○ anaphase ○ telophase ○ cytokinesis ● **explain** how new cells are created through mitosis ● **explain** why maintaining chromosome number during asexual reproduction is important	**Content Limits :** ❖ Items will focus on the relationship between mutations and uncontrolled cell growth, rather than a specific mutation that may result in uncontrolled cell growth. ❖ Items may address the presence and location of centrioles but may not require knowledge of the function of centrioles. ❖ Items referring to mutation will focus on the general concepts of uncontrolled cell growth and not require specific knowledge of cancers or diseases resulting from that growth. ❖ Items will not assess the specific proteins associated with regulating the cell cycle. ❖ Items addressing mitosis or meiosis are limited to identification of

	10.2 -Chromosome structure -Cell cycle -Mitosis and cytokinesis 10.3 -Uncontrolled cell growth/cancer ★ binary fission ★ ★ cancer ★ carcinogen ★ oncogene 11.4 -Meiosis ★ crossing over ★ tetrad ★ homologous chromosomes ★ independent assortment ★ gamete ★ spore ★ haploid ★ diploid	SC.912.L.16.15: ***Compare and contrast*** *binary fission and mitotic cell division.* *****Honors Only*** ● ***Differentiate*** *binary fission and mitotic cell division.* SC.912.L.16.8: **Explain** the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer. ● **describe** cancer as uncontrolled cell growth that may have resulted from mutations affecting cell cycle -regulating proteins SC.912.L.16.16: **Describe** the process of meiosis, including independent assortment and crossing over. **Explain** how reduction division results in the formation of haploid gametes or spores.	phases, structures, and major events of each phase.
3	**ADI**	**Introduction** Lab 18-DNA structure: what is the structure of DNA? **Application** Lab 3- Cell Cycle Lab 4- Normal and Abnormal Cell Division Lab 5-Photosynthesis: why do temperature and light intensity affect the rate of photosynthesis in plants? Lab 6- Cellular Respiration: How does the type of food source affect the rate of cellular respiration in yeast? Lab 8- Enzymes: How do changes in temperature and pH levels Affect enzyme activity? Lab 19-Meiosis: how does the process of meiosis reduce reduce the number of chromosomes in reproductive cells?	

2nd QUARTER CHECKPOINT

2nd Semester (95-98 days)

Curriculum Map Overview
Unit #3:
Applied Genetics (11, 14, 15)
Evolution
Health

- ❑ **4th Quarter Checkpoint (11, 14-15,16-19, 22-24, 31, 33, 34, 35)**

Unit #4
Plants and ecosystems
Populations in the biosphere

- ❑ **4th Quarter Checkpoint (3-6, 31-35)**

Post EOC Unit
If you have not been able to do any ADI's now would be a good time to do at least 1, to prepare students for their next science course.

You may decide as a dept/classroom to paces/organize concepts differently; however, adhering to the **quarter checkpoints** is **critical** to allow for ease of student transfers between classes/teachers/schools; especially as it concerns leveling students from Honors to Standard after the 1st quarter.

Flexible Days allow for extra time on a topic, midterm/final exams review, assembly days, testing (FSA, EOC, AP), covering literacy/language standards, etc.

On Going
1: Lab Skills

- Microscopes
- Incubators
- Graduated Cylinders
- Beakers
- Flasks
- Scales

2: Scientific Method

- Identifying Variables
- Develop Experiments
- Gathering Data
- Analyzing Results
- Communicate Conclusions
- Publish Results

3: Using Models and Graphs

- Understanding models
- Changing Models
- Making Graphs
- Interpreting Graphs

4: Theory Vs Law Vs Hypothesis

5. Personal Health Choices

*these topics should be addressed continuously, and/or whenever the content allows for them

"EOC TESTING"

Denotes Math/History/Science

SAMPLE 3rd Quarter. Sample is only to show how pacing might work it is not a day-to-day guide

Week	Monday	Tuesday	Wednesday	Thursday	Friday
1: 1/4-1/8	Teacher Planning		Ch 11 Applied Genetics	Ch 11 Applied Genetics	Ch 11 Applied Genetics
2: 1/11-1/15	Flexible	Ch 11 Applied Genetics	Ch 11 Applied Genetics	Sec 14-1 Applied Genetics	Sec 14-1 Applied Genetics
3: 1/18-1/22	MLK Day	Ch 15 Applied Genetics	Ch 15 Applied Genetics	Ch 15 Applied Genetics	Ch 15 Applied Genetics
4: 1/25-1/29	Flexible	Sec. 16-3 & 16-4 Evolution	Sec. 16-3 & 16-4 Evolution	Sec. 16-3 & 16-4 Evolution	Sec. 17-2 Evolution
5: 2/1-2/5	Flexible	Sec. 17-2 Evolution	Sec. 17-2 Evolution	Sec. 26-3 Evolution	Sec. 26-3 Evolution
6: 2/8-2/12	Flexible	Sec. 26-3 Evolution	Sec. 19-3 Evolution	Sec. 19-3 Evolution	Sec. 19-3 Evolution
7: 2/15-2/19	President's Day	Ch 18 Evolution	Ch 18 Evolution	Ch 18 Evolution	Ch 18 Evolution
8: 2/22-2/26	Flexible	Sec. 31-2 Human Body Systems	Sec. 31-2 Human Body Systems	Sec. 33-1 Human Body Systems	Sec. 33-1 Human Body Systems
9: 2/29-3/4	Flexible	Sec. 33-2 Human Body Systems	Sec.34-3 Human Body Systems	Sec. 34-3 Human Body Systems	Sec. 34-4 Human Body Systems
10: 3/7-3/11	Flexible	Sec. 35-1 Human Body Systems	Sec. 35-1 Human Body Systems	Sec. 35-2 Human Body Systems	Sec. 35-3 Human Body Systems
3/14-3/18	SPRING BREAK				
11: 3/21-3/25	Flexible	ADI	ADI	ADI	Good Friday
12: 3/28-4/1	Flexible	**Ch 23 Plants**	**Ch 23 Plants**	**Ch 23 Plants**	**Ch 23 Plants**
SAMPLE 4th Quarter					
13: 4/4-4/8	Teacher planning	**Ch 24 Plants**	**Ch 24 Plants**	**Ch 24 Plants**	**Ch 24 Plants**
14: 4/11-4/15	Flexible	**Ch 3 Ecology**	**Ch 3 Ecology**	**Ch 3 Ecology**	**Ch 3 Ecology**
15: 4/18-4/22	EOC TESTING	**Ch 4 Ecology**	**Ch 4 Ecology**	**Ch 4 Ecology**	**Ch 4 Ecology**
16: 4/25-4/29	EOC TESTING	**Ch 5 Ecology**	**Ch 5 Ecology**	**Ch 5 Ecology**	**Ch 5 Ecology**
17: 5/2-5/6	EOC TESTING	**Ch 6 Ecology**	**Ch 6 Ecology**	**Ch 6 Ecology**	**Ch 6 Ecology**
18: 5/9-5/13	EOC TESTING	Flexible	Flexible	Flexible	Flexible
19: 5/16-5/20	EOC TESTING	Flexible	Flexible	Flexible	Flexible

		20: 5/23-5/27	EOC TESTING	Flexible	Flexible	Flexible	Flexible
		21: 5/30-6/3	*Memorial Day*	Flexible	*½ Day*	*½ Day*	*½ Day*
		6/6	Teacher planning	*Report Cards Available in June …*			

Unit #3 (3rd 9 weeks)

Time	Topics	Biology Standards	On-Going/Nature of Science/Content Limits
	Intro to Genetics: 11.1 -Principle of dominance -Law of segregation ★ law of segregation ★ law of independent assortment ★ dominant ★ P generation ★ F_1 generation ★ F_2 generation 11.2 -Law of independent assortment -Phenotype vs genotype 11.3 -Other patterns of inheritance (codominance, multiple alleles, polygenic traits) ★ codominant ★ sex-linked ★ multiple alleles ★ heredity ★ punnett square ★ dihybrid cross ★ recessive ★ polygenic ★ genotype ★ phenotype ★ pedigree	**SC.912.L.16.1: Use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance. (EOC)** ● **analyze** patterns of inheritance using Mendel's Laws of segregation and independent assortment **SC.912.L.16.2: Discuss** observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles. ● **identify, analyze, and/or predict** traits caused by various modes of inheritance, including: ○ dominant ○ recessive ○ co -dominant ○ sex -linked ○ polygenic ○ multiple alleles ● **predict** the genotype and phenotype of the P1 and F1 generations using Punnett squares and pedigree diagrams ● **construct** a dihybrid cross that results in the ratio of 9:3:3:1	**Content Limits :** ❖ Items referring to general dominant and recessive traits may address but will not assess the P and F1 generations. ❖ Items addressing dihybrid crosses or patterns that include codominance, incomplete dominance, multiple alleles, sex-linkage, or polygenic inheritance may assess the P and F1 generations.

	14.1 -Sex-linked inheritance -Blood type inheritance -Pedigree charts ★ pathogen	SC.912.L.14.6: **Explain** the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health. HE.912.C.1.7: **Analyze** how heredity and family history can impact personal health.	
	Genetic Engineering: 15.1 -Biotechnology ★ karyotype ★ clone ★ gene therapy ★ GMO ★ DNA fingerprinting ★ recombinant DNA 15.2 -Process of creating recombinant DNA -Process of cloning ★ endonucleases ★ gel electrophoresis ★ PCR polymerase chain reaction ★ ligation ★ DNA cloning ★ transformation 15.3 -GM crops & animals -Gene therapy 15.4 -Ethics & impact of biotechnology	SC.912.L.16.10: **Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.** (EOC) • **evaluate** the possible impact of biotechnology on the individual, society, and the environment, including medical and ethical issues, such as: ○ o karyotyping ○ o DNA fingerprinting ○ o cloning ○ o gene therapy ○ o genetically modified foods and artificial selection *SC.912.L.16.12:* ***Describe*** *how basic DNA technology (restriction digestion by endonucleases, gel electrophoresis, polymerase chain reaction, ligation, and transformation) is used to construct recombinant DNA molecules (DNA cloning).* *****Honors Only*** • ***Describe*** *the basic DNA technology (restriction digestion by endonucleases, gel electrophoresis, polymerase chain reaction, ligation, and transformation) is used to construct recombinant DNA molecules (DNA cloning.)*	**Content Limits :** Items may assess current issues but will not require knowledge of specific biotechnologies or specific medical issues. Items assessing the possible impacts of biotechnology will not assess monetary impacts.

	Evolution: 16.1 * Fossil 16.3 -Natural selection ★ evolution ★ natural selection ★ variation ★ adaptation 16.4 * vestigial structure ● analogous structures ● vestigial structure ● homologous structure ★ genetic drift ★ gene flow ★ non-random mating ★ observed evolutionary change 16.4 -Evidence for evolution -Biogeography -Fossil records -Comparative anatomy -Embryology -Molecular biology 17.1 *gene pool 17.2 -Mechanisms for evolution -Genetic drift -Gene flow Molecular clock ★ biological diversity ★ extinction ★ origin of species 19.2 *convergent evolution ● coevolution ● gradualism ● adaptive radiation ● punctuated equilibrium	**SC.912.L.15.13: Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success. (EOC)** ● **describe** the conditions required for natural selection that result in differential reproductive success, including: ○ overproduction of offspring, inherited variation, and the struggle to survive ● **explain** how biological diversity is increased by the emergence of new species and decreased by natural selection **SC.912.L.15.14: Discuss** mechanisms of evolutionary change other than natural selection such as genetic drift and gene flow. ● **discuss** mechanisms of change other than natural selection, such as: o genetic drift, gene flow, and non -random mating **SC.912.L.15.15: Describe** how mutation and genetic recombination increase genetic variation. ● **explain** how mutation and genetic recombination increases genetic variation **SC.912.L.15.1: Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change. (EOC)** ● **explain** why the scientific theory of evolution is supported through various disciplines and evidence, such as: o fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed changes over time ***SC.912.L.15.2: Discuss** the use of molecular clocks to estimate how long ago various groups of organisms diverged evolutionarily from one another. ****Honors Only*** ***SC.912.L.15.3: Describe** how biological diversity is increased by the origin of new species and how it is decreased by the natural process of extinction. ****Honors Only*** **SC.912.L.15.10: Identify** basic trends in hominid evolution from early ancestors six million years ago to modern humans, including brain size, jaw size, language, and manufacture of tools.	**Content Limits :** ❖ Items will not address descent with modification or common descent. ❖ Items addressing mutation and genetic recombination in relation to increasing genetic variation must be assessed in the context of evolution. ❖ Items will not assess the Hardy-Weinberg principle or genetic equilibrium. ❖ Items may address how meiosis contributes to genetic variation but may not assess the steps or stages of meiosis. **Content Limits :** ❖ Items assessing evolution will focus on a conceptual understanding of the supporting scientific evidence. ❖ Items will not require memorization of the names of specific human fossils or the names of the different hominid species. ❖ Items assessing the fossil record must focus on the fossil rather than geologic formations in isolation. ❖ Items assessing the fossil record will not require understanding of the specific mechanisms used for relative dating and radioactive dating. ❖ Items will not require the memorization of the geologic time scale, including era, period, and/or epoch. ❖ Items will not assess the origin of Earth. ❖ Items will not assess specific knowledge of the formation of microspheres or the evolution of RNA and DNA.

	Other vocabulary ● speciation ● geographic Isolation ● divergent evolution ● population 26.3 -Hominid evolution (brain, jaw, language, tools) ★ hominid ★ evolution		❖ Items will not address or assess the endosymbiotic theory. ❖ Items referring to adaptive radiation, convergent evolution, coevolution, or punctuated equilibrium should focus on the concepts rather than on the definition of the terms. ❖ Items referring to the development of language or the manufacturing of tools will relate this development to changes in the skull or brain size. ❖ Items will not assess types of genetic mutation or how these mutations occur. ❖ Items referring to comparative anatomy and comparative embryology will assess anatomical similarities such as homologous structures and vestigial organs but will not require specific knowledge of embryologic stages or structures. ❖ Items will not require knowledge of changes to specific species or geographic location of those species. ❖ Items will not assess genes, alleles, genetic drift, or gene flow. ❖ Items may assess how the overall contributions of scientists such as Darwin, Lamarck, Lyell, Malthus, Mendel, or Wallace aided in the development of the scientific theory of evolution. ❖ Items will not assess the differences among intelligent

			design, creationism, and the scientific theory of evolution. ❖ Items assessing a scientific claim, the development of a theory, or the differences between theories and laws are limited to the scientific theory of evolution.
	Earth's Early History: 19.3 -Earth's atmosphere -Miller & Urey experiment -Endosymbiotic theory	*SC.912.L.14.5:* ***Explain*** *the evidence supporting the scientific theory of the origin of eukaryotic cells (endosymbiosis)* SC.912.L.15.8: **Describe the scientific explanations of the origin of life on Earth. (EOC)** ● **describe** scientific explanations of the origin of life on Earth, such as those posed by: o Oparin, Miller and Urey, Margulis, Fox, and Pasteur ● **identify** conditions contributing to the origin of life on Earth, such as: o organic molecule synthesis, Earth's early atmosphere, primordial soup	**Content Limits :** ❖ Items may address the conditions required for the origin of life on Earth but may not require specific knowledge of the age of Earth or its eras, periods, or epochs. ❖ Items may assess how contributions of scientists such as Pasteur, Oparin, Miller and Urey, Margulis, or Fox aided in the development of the scientific explanation of the origin of life but will not assess what each scientist contributed. ❖ Items assessing the origin of organic molecules, chemical evolution, and/or eukaryotic cells should be conceptual. ❖ Items may refer to the endosymbiotic theory but may not assess the term in isolation. ❖ Items assessing a scientific claim are limited to the scientific explanations of the origins of life on Earth.
	Classification: 18.1 -Linnaean classification system -Traditional vs modern classification	SC.912.L.15.6: **Discuss distinguishing characteristics of the domains and kingdoms of living organisms. (EOC)** ● **determine** if an organism is: ○ prokaryotic vs. eukaryotic ○ unicellular vs. multicellular	**Content Limits :** ❖ Items referring to distinguishing characteristics of living organisms are limited to the domains of Archea,

	18.2 -Evolutionary classification -Cladogram & derived characters 18.3 -Domains & kingdoms	○ autotrophs vs. heterotrophs ● **classify** organisms using distinguishing characteristics into the three domains: ○ Archaea, Eubacteria, Eukarya ● **classify** organisms using distinguishing characteristics into the six kingdoms: ○ Archaea, Eubacteria, Protista, Fungi, Plantae, and Animalia **SC.912.L.15.4: Describe** how and why organisms are hierarchically classified and based on evolutionary relationships. ● **explain** how and why organisms are hierarchically classified based on evolutionary relationships ● **create** a cladogram to differentiate the characteristics of five or more organisms ● **analyze** a cladogram to determine evolutionary relationships among various organisms **SC.912.L.15.5: Explain** the reasons for changes in how organisms are classified. ● **explain** why the classification of an organism may change, for example: ○ using genetic evidence to show common ancestry ○ technological advances such as improved microscope ○ molecular analysis (cell wall of bacteria and archaea) ○ discovery of new organisms	Bacteria, and Eukarya and the kingdoms of Protista, Fungi, Plantae, and Animalia. ❖ Items will not require specific knowledge of organisms classified in any domain or kingdom; items should describe the characteristics of an organism and assess its classification. ❖ Items may refer to prokaryotic, eukaryotic, unicellular and/or multicellular organisms, autotrophs, and/or heterotrophs, but they will not assess the definition of those terms. ❖ Items referring to changes in classification systems should be conceptual and will not require specific knowledge of those changes. ❖ Items may address evolutionary classification, phylogeny, and the use of cladograms, but they may not assess the definition of those terms. ❖ Items assessing a scientific claim are limited to the classification of organisms.
	Human Body Systems: 31.2 -Structure and function of parts of the brain ★ medulla ★ pons ★ midbrain ★ hypothalamus ★ cerebellum ★ cerebrum	**SC.912.L.14.26: Identify the major parts of the brain on diagrams or models. (EOC)** ● **identify** the parts and lobes of the brain, including: ○ lobes: frontal, parietal, occipital, and temporal ○ parts: cerebrum, cerebellum, pons, medulla oblongata, and brain stem **SC.912.L.14.27:** ***Identify*** *the functions of the major parts of the brain, including the meninges, medulla, pons, midbrain, hypothalamus, thalamus, cerebellum and cerebrum.*	**Content Limits :** ❖ Items are limited to the cerebrum, cerebellum, pons, medulla oblongata, brain stem, frontal lobe, parietal lobe, occipital lobe, and temporal lobe. ❖ Items will not assess the function of the major parts of the brain.
	30.2	**(See on-going)**	

	33.1 -Circulatory system 33.2 -Components of blood -Factors that affect blood flow (pressure, volume, resistance, viscosity, disease, exercise)	**SC.912.L.14.36: Describe the factors affecting blood flow through the cardiovascular system. (EOC)** ● **explain** how blood flow in the cardiovascular system is affect by various factors, including: ○ blood pressure, blood volume, resistance, disease and exercise HE.912.C.1.3: Evaluate how environment and personal health are interrelated. ● Food options within a community; ● availability of recreational facilities; ● air quality; ● weather-safety awareness; ● weather, air, and water conditions. ● prenatal-care services; HE.912.C.1.7: Analyze how heredity and family history can impact personal health.	**Content Limits :** ❖ Items may address factors such as blood pressure, blood volume, resistance, disease, and exercise.
	35.1 -Infectious disease -Causes (factors) -How it spreads 35.2 -Functions of immune system defense (specific & nonspecific) -Response 35.3 -Fighting disease -Vaccines -Antibiotics -Public health	**SC.912.L.14.52: Explain the basic functions of the human immune system, including specific and nonspecific immune response, vaccines, and antibiotics. (EOC)** ● **describe** the basic functions of the human immune system, including: ○ specific and nonspecific immune response, vaccines, and antibiotics **SC.912.L.14.6: Explain** the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health. ● **explain** how both individual and public health are impacted by: ○ genetic factors, environmental factors, pathogenic agents ● **analyze** family history to determine its impact on an individual's health ● **discuss** strategies for prevention, detection, and treatment of communicable and chronic diseases HE.912.C.1.5: Analyze strategies for prevention, detection, and treatment of communicable and chronic diseases. ● detection, and treatment of: ○ breast/testicular cancer ○ Obesity ○ and industrial-related chronic disease.	**Content Limits :** ❖ Items assessing the significance of genetic factors, environmental factors, and pathogenic agents to health are limited to a conceptual understanding.
	34.3 -Anatomy and physiology of reproductive system 34.4 -Fertilization & development -Major changes in each trimester	**SC.912.L.16.13: Describe the basic anatomy and physiology of the human reproductive system. Describe the process of human development from fertilization to birth and major changes that occur in each trimester of pregnancy. (EOC)** ● **identify** on a diagram and **describe** the basic female human reproductive system anatomy and physiology, including: ○ ovaries, oviduct (fallopian tube), uterus, cervix, and vagina ● **identify** on a diagram and **describe** the basic male anatomy and physiology of the human reproductive system, including: ○ seminal vesicle, prostate gland, vas deferens, urethra, epididymis, scrotum, penis and testes	**Content Limits :** ❖ Items referring to the male human reproductive system are limited to the seminal vesicle, prostate gland, vas deferens,

		● **describe** the function of the placenta, umbilical cord, amniotic sac, amniotic fluid in terms of fetus development ● **identify** on a diagram the location where each process of human development occurs from fertilization to implantation ● **describe** the process of human development from fertilization to birth and major changes that occur in each trimester of pregnancy ○ First trimester (development): major organs, limbs, and other structures begin to form, heart starts to beat ○ Second trimester (maturity):organs start functioning, fetal movement, hearing and simple vision, practice breathing, sleep patterns ○ Third trimester (growth):increase in size, fat storage, neural connections, lungs, mature	urethra, epididymis, scrotum, penis, and testes. ❖ Items referring to the female human reproductive system are limited to the ovaries, oviduct (fallopian tube), uterus, cervix, and vagina. ❖ Items assessing the function of the placenta, umbilical cord, amniotic sac, and amniotic fluid are limited to how these structures relate to the development of the fetus. ❖ Items will not assess physiological or hormonal changes of the mother during pregnancy. ❖ Items assessing the production of hormones in the context of the physiology of the human reproductive system are limited to a conceptual understanding of the production of hormones. ❖ Items will not assess hormonal control during pregnancy. ❖ Items may refer to the early stages of development (implantation, morula, blastocyst, gastrulation, neurulation) but will not assess the definition of these terms. ❖ Items referring to changes in each trimester are limited to normal human development. ❖ Items will not assess specific knowledge of malformations in the human fetus, miscarriages, maternal pre-existing conditions, genetic conditions, or the impact of exposure to environmental conditions. ❖ Items will not assess the utilization of technology to

			assist in or prevent fertilization or monitor development of the fetus. ❖ Items will not address or assess the menstrual cycle.
3		**Introduction** Lab 16- Mendelian genetics: why are the stem and leaf color traits of the wisconsin fast plant inherited in a predictable pattern? Lab 17- Chromosomes and karyotypes: how do two physically healthy parents produce a child with down syndrome and a second child with cri du chat syndrome? Lab 22-Biodiversity and the fossil record: how has biodiversity on earth changed over time? Lab 23-Mechanisms of Evolutions: why will the characteristics of a bug population change in different ways in response to different types of predation? **Application** Lab 20-Inheritance of blood type: are all of Mr. Johnson's children his biological offspring? Lab 21- Models of inheritance: Which model of inheritance best explains how a specific trait is inherited in fruit flies? Lab 24-Descent with modification: does mammalian brain structure support or refute the theory of descent with modification> Lab 25-Mechanisms of speciation: why does geographic isolation lead to the formation of a new species? Lab 26-Human evolution: how are humans related to other members of the family *Hominidae*? Lab 27-Whale Evolution: How are whales related to other mammals?	

Unit #4 (4th 9 weeks)

Time	Topics	Biology Standards	On-Going/Nature of Science/Content Limits
	Plants ★ phloem ★ xylem ★ cambrium ★ toots ★ shoots ★ leaf ★ flower	**SC.912.L.14.7: Relate the structure of each of the major plant organs and tissues to physiological processes. (EOC)** ● Plants are primary producers using abiotic factors to produce energy molecules ● **explain** how plants are classified based on distinguishing characteristics ● **explain** how the following plant organs and tissues are directly related to the four physiological processes ● **describe** the role of meristematic, ground, dermal and vascular plant tissues in various plant organs	**Content Limits :** ❖ Items will assess the function of plant tissues and organs in the context of physiological processes. ❖ Items assessing plant organs are limited to roots, stems, leaves, flowers, fruits, and cones.

	★ stem ★ bud ★ meristem ★ ground tissue ★ stoma ★ monocot ★ dicot ★ fibrous root ★ tap root ★ cotyledons ★ dermal tissue ★ vascular tissue	• **differentiate** the structures of monocot and dicot, including: o branching versus parallel veins o fibrous versus tap root o seed leaves (cotyledons)	❖ Items referring to physiological processes are limited to photosynthesis, cellular respiration, transpiration, and reproduction. ❖ Items assessing plant tissues are limited to meristematic, ground, dermal, and vascular tissues. ❖ Items referring to plant structures are limited to cambium, guard cells, phloem, seed, stomata, and xylem. ❖ Items will not address or assess mitosis or meiosis
	3.1 * biosphere • community • biotic factors • population • ecology • ecosystem 3.2 * autotroph *heterotrophs * Herbivore *Carnivore * Consumers * Omnivore *Scavenger * Decomposer * producers 3.3 * trophic level • food chain • biomass • food web • ecological pyramid 3.4 * nitrogen fixation • fossil fuel 4.1 * Climate 4.2 * Symbiosis	**SC.912.L.17.9: Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels. (EOC)** • **determine** the roles of various organisms in a particular food web, including: o producers o consumers o decomposers • **determine** the path of energy transfer through successive trophic levels of a food web or energy pyramid in terms of: o Primary consumer o Secondary consumer o Tertiary consumer • **explain** why the amount of available energy is reduced in successive trophic levels, such as: o the metabolism in each of the lower trophic levels releases some as heat (10% Rule) **SC.912.E.7.1: Analyze** the movement of matter and energy through the different biogeochemical cycles, including water and carbon. • **diagram** the movement of matter and energy through the water and carbon (biogeochemical cycles) SC.912.L.17.2: Explain the general distribution of life in aquatic systems as a function of chemistry, geography, light, depth, salinity, and temperature. • **explain** why the type of organism found within a specific aquatic system depends on various abiotic factors, including: o depth, latitude, temperature, underwater topography (caves and corals), light, proximity to land, pH, oxygen, carbon dioxide, nitrogen, and phosphorous • **predict** the impact a change in one or more abiotic factors will have on an aquatic population and/or ecosystem	**Content Limits :** ❖ Items referring to organisms in food webs are limited to the impact of changes in matter or energy in trophic levels. ❖ Items addressing food webs will require application of the knowledge of roles of organisms in a food web to describe energy pathways rather than the identification of producers, consumers (primary, secondary, tertiary), and decomposers. ❖ Items will not require knowledge of specific organisms or their feeding habits. ❖ Items assessing biogeochemical cycles are limited to the water cycle and the carbon cycle. ❖ Items referring to the biogeochemical cycles may address but will not assess photosynthesis and cellular respiration in isolation.

	• Predation • Parasitism • Mutualism • Commensalism • Habitat 4.4 * biome 5.1 * carrying capacity • exponential growth 5.2 * density dependent limiting factor • density independent limiting factor • limiting factor 6.2 * biological magnification	**SC.912.L.17.5: Analyze how population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carrying capacity. (EOC)** • **describe** a population's size in terms of births, deaths, emigration, and immigration • **explain** how limiting factors determine carrying capacity and influences a population's size • **predict** the impact a change to the abiotic and/or biotic limiting factors will have on a population's size or dynamic (births, deaths, etc.) o limiting factors include: carrying capacity, symbiotic relationships, available resources, etc. SC.912.L.17.4: Describe changes in ecosystems resulting from seasonal variations, climate change and succession. • **predict** potential changes or responses in an ecosystem resulting from: o seasonal variations, climate change, and succession SC.912.L.17.8: Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species. • **describe** the impact to an ecosystem's biodiversity in terms of: o catastrophic events, climate changes, human activity and the introduction of invasive and nonnative species • **predict** both the positive and negative consequences a reduction in biodiversity will have on a population or ecosystem **SC.912.L.17.20: Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability. (EOC)** • **predict** the impact of individuals on environmental systems • **explain** how human lifestyles affect sustainability SC.912.L.17.11: **Evaluate** the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests. • **evaluate** the possible environmental costs and benefits resulting from the use of renewable and nonrenewable resources, such as: o water, energy, fossil fuels, wildlife, and forests SC.912.L.17.13: Discuss the need for adequate monitoring of environmental parameters when making policy decisions. (This is an environmental standard) • list policies or rules that are in effect and describe the impact these policies have on the environment and people	**Content Limits :** ❖ Items referring to chemical factors in aquatic systems are limited to pH, oxygen, carbon dioxide, nitrogen, phosphorous, and salinity. ❖ Items referring to geography in aquatic systems are limited to water depth, latitude, temperature, underwater topography, and proximity to land. ❖ Items will not require the identification of oceanic zones. ❖ Items referring to reduction in biodiversity may include examples of catastrophic events, climate changes, human activities, and the introduction of invasive and nonnative species, but they will not assess specific knowledge of these. ❖ Items referring to reduction in biodiversity will focus on the consequence and not require knowledge of the specific event that led to the reduction. ❖ Items addressing climate change are limited to biodiversity and population dynamics contexts. **Content Limits :** ❖ Items referring to renewable and nonrenewable resources will focus on the environmental costs and benefits of using those resources and not on identifying examples of renewable and nonrenewable resources. ❖ Items will not require knowledge of specific environmental regulations, pollution prevention technologies or devices, or other mechanisms used to prevent pollution. ❖ Items assessing a scientific claim are limited to impacts on the

		SC.912.L.17.16: ***Discuss*** *the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.* *****Honors Only*** ● ***Discuss*** *the large -scale en* *including water spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.*	environment and renewable and nonrenewable resources.
3	**ADI**	**Introduction** Lab 9-Population Growth: How do changes in amount and nature of the plant life available in an ecosystem influence herbivore population growth over time Lab 10-Predator-prey population size relationships: which factors affect the stability of a predator-prey population size relationship? Lab 11-Ecosystems and biodiversity: how does food web complexity affect the biodiversity of an ecosystem? Lab 12-Explanations for animal behavior: why do great white sharks travel over long distances? **Application** Lab 7-Transpiration: how does leaf surface area affect the movement of water through a plant? Lab 13-Environmental influences on animal behavior: how has climate change affected bird migration? Lab 14-Interdependence of organisms: why is sport fish population of Lake Grace decreasing in size? Lab 15-Competition for resources: how has the spread of the Eurasian Collared-Dove affected different populations of native bird species?	

4th QUARTER CHECKPOINT

Cognitive Complexity - The benchmarks in the Next **Generation Sunshine State Standards (NGSSS)** identify knowledge and skills students are expected to acquire at each grade level, with the underlying expectation that students also demonstrate critical thinking.
The categories—**low complexity**, **moderate complexity**, **high complexity**—form an ordered description of the demands a test item may make on a student.
Instruction in the classroom should match, at a minimum, the complexity level of the learning target in the curriculum map.

Low	Moderate	High
This category relies heavily on the recall and recognition of previously learned concepts and principles. Items typically specify what the student is to do, which is often to carry out some procedures that can be performed mechanically. It is not left to the student to come up with an original method or solution.	This category involves more flexible thinking and choice among alternatives than low complexity items. They require a response that goes beyond the habitual, is not specified, and ordinarily has more than a single step or thought process. The student is expected to decide what to do—using formal methods of reasoning and problem -solving strategies together skill and knowledge from various domains.	This category makes heavy demands on student thinking. Students must engage in more abstract reasoning, planning, analysis, judgment, and creative thought. The items require that the student think in an abstract and sophisticated way often involving multiple steps.

Students will • **retrieve information** from a chart, table, diagram, or graph • **recognize** a standard scientific representation of a simple phenomenon • **complete** a familiar single -step or equation using a reference sheet	Students will • **interpret** data from a chart, table, or simple graph • **determine** the best way to organize or present data from observations, an investigation, or experiment • **describe** examples and non -examples of scientific processes or concepts • **specify** or **explain** relationships among different groups, facts, properties, or variables • **differentiate** structure and functions of different organisms or systems • **predict** or **determine** the logical next step or outcome • **apply** and **use concepts** from a standard scientific model or theory	Students will •**analyze** data from an investigation or experiment and formulate a conclusion • **develop** a generalization from multiple data sources • **analyze** and **evaluate** an experiment with multiple variables • **analyze** an investigation or experiment to identify a flaw and propose a method for correcting it • **analyze** a problem, situation, or system and make long -term predictions • **interpret**, **explain,** or **solve** a problem involving complex spatial relationships

*Adapted from Webb's Depth of Knowledge and FLDOE FCAT 2.0 Specification Documentation, Version 2.

Course Related Math Standards to be integrated throughout the year as applicable

The math standards naturally fall into the biology course; through lecture content, lab content, and argument driven inquiry. Feel free to track when/where you use the following math standards in the note space provided

Number & Quantity (these are the only 2 MAFS standards for Standard Biology)	**Notes**
MAFS.912.N-Q.1.1: Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.	
MAFS.912.N-Q.1.3: Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	
Functions: Interpreting Functions ****Honors Only**	**Notes**
MAFS.912.F-IF.2.4: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*	
MAFS.912.F-IF.3.7: Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift.	
Geometry: Modeling with Geometry ****Honors Only**	**Notes**
MAFS.912.G-MG.1.2: Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★	
Statistics & Probability: Interpreting Categorical & Quantitative Data ****Honors Only**	**Notes**
MAFS.912.S-ID.1.1: Represent data with plots on the real number line (dot plots, histograms, and box plots). ★	
MAFS.912.S-ID.1.2: Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. ★	
MAFS.912.S-ID.1.3: Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).	
MAFS.912.S-ID.1.4: Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.	
MAFS.912.S-ID.2.5: Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. ★	
MAFS.912.S-IC.2.6: Evaluate reports based on data. ★	

Literacy Standards (By Quarter where applicable)

Literacy Standards (9th/10th)	1	2	3	4
LAFS.910.RST.1.1: Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.	*			*
LAFS.910.RST.1.2: Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.	*		*	
LAFS.910.RST.1.3: Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.		*		*
LAFS.910.RST.2.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.	*			
LAFS.910.RST.2.5: Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).	*		*	
LAFS.910.RST.2.6: Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.		*		
LAFS.910.RST.3.7: Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.			*	
LAFS.910.RST.3.8: Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.			*	
LAFS.910.RST.3.9: Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.			*	
LAFS.910.RST.4.10: By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.	*	*	*	*
LAFS.910.WHST.1.1: Write arguments focused on *discipline-specific content.* 1. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. 2. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns. 3. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. 4. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. 5. Provide a concluding statement or section that follows from or supports the argument presented.			*	

Literacy Standards (9th/10th)	1	2	3	4
LAFS.910.WHST.1.2: Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. 1. Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. 2. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. 3. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts. 4. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers. 5. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. 6. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).	*	*		
LAFS.910.WHST.2.4: Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	*			
LAFS.910.WHST.2.5: Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.	*			
LAFS.910.WHST.2.6: Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.	*	*	*	
LAFS.910.WHST.3.7:Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.	*	*	*	
LAFS.910.WHST.3.8: Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.	*	*	*	
LAFS.910.WHST.3.9: Draw evidence from informational texts to support analysis, reflection, and research.	*			*
LAFS.910.WHST.4.10: Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.	*	*		*

Speaking and Listening Standards to be integrated throughout the year as applicable

Standards for Speaking and Listening (9th/10th)
LAFS.910.SL.1.1:Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. 1. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. 2. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed. 3. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions. 4. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.
LAFS.910.SL.1.2: Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
LAFS.910.SL.1.3: Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.
LAFS.910.SL.2.4: Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
LAFS.910.SL.2.5: Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.